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Forest Service

**Forest Health Enterprise
Team—Fort Collins**

Fort Collins,
Colorado 80524

FHTET Report 96-09

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Forest Health Technology Enterprise Team-Fort Collins 1995 Accomplishment Report

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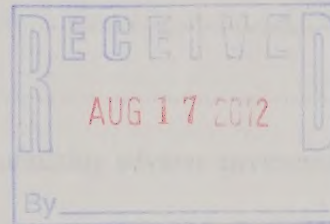


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Forest Health Technology Enterprise Team-Fort Collins 1995 Accomplishment Report

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Mission

The mission of the Forest Health Technology Enterprise Team-Fort Collins (FHTET-FC, formerly Methods Application Group) is to provide forest health assessment technologies that are integral to forest ecosystem management.

Goals and Objectives

The FHTET-FC accomplishments for Fiscal Year (FY) 1995 relate to the following Forest Health Protection goals and objectives:

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership. To maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership.

Objective # 3: Improve pest management delivery system at all levels.

Objective # 5: Develop, update, and/or improve information data gathering systems.

Objective # 6: Encourage application of new technology developed by research to enable forest pest management to meet Forest Service commitment to integrated pest management.

Goal # 2: Maximize internal and public trust in Forest Service pest management programs.

Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Pest Management to meet Forest Service commitment to integrated pest management.

FY 1995 Highlights

Highlights of Fiscal Year 1995

Accomplishments

Technology Development

Airborne Sensor Evaluation—Evaluated the new digital color infrared camera for vegetation stressor detection with imagery of several types of forest health problems in Region 4 and Northeast Area (NA). Preliminary results are very promising. More detailed analyses of data and further evaluations are in progress.

Development of Data Visualization Capabilities—Made significant progress toward providing FHP with the ability to display the effects of pest impacts and forest management alternatives on the landscape in a form and context understandable to our publics and resource managers.

Developed and implemented mechanisms for collaboration with academic institutions for developing data visualization capabilities through a memorandum of understanding with-cooperating universities and a cooperative agreement with the University of Illinois.

Development of Single Pest Models—Completed development and testing of several insect and disease models developed by FHP staffs with FHP Technology Development Program (TDP) funding.

Completed draft user's guides and other documents describing the Annosus Model and the Dwarf Mistletoe Model. The White Pine Blister Rust Model is being tested in Regions 1 and 6.

Conducted a test of the Westwide Pine Beetle Model behavior against historical data sets and expert opinion using mountain pine beetle data from Pacific Southwest Station for the Black's Mountain Experimental Forest. Presented the model to potential users at the Western Forest Insect Work Conference.

Contributed to the TDP project sponsored by Region 6 to create a defoliation model for western spruce budworm based on a revision of the Canada USA Spruce Budworm Program (CANUSA) population dynamics model. Provided modeling and programming expertise; will be responsible for implementing the model within the Forest Vegetation Simulator (FVS) system.

Progress Toward the Development of a Multi-pest Model—Made progress with the short-term and interim strategies of modeling high priority pest complexes formulated by the 1993 strategic plan workshop. The Annosus root disease and the combined root disease models, currently in development, introduce multiple pest interactions within the framework of existing models. The Westwide Pine Beetle Model also has a limited set of pest interactions; it also encompasses a broader geographic scope.

Review of Resource and Ecosystem Process Models—With Colorado State University, reviewed non-timber resource models and ecosystem process models to ascertain how pest impact information can be integrated into them by linking them to the FVS and existing pest impact models. The review included extensive polling of Forest Service personnel in various resource staffs and in all Regions concerning the models they actually used. Results were provided to the Ecosystem Management Analysis Center in a format compatible with their existing model data base. Produced two extensive

review documents. Participated in resource model extensions of FVS for wildlife snag habitat and fire management.

Requirements Analysis for Decision Support Needs—Conducted a detailed requirements analysis for decision support needs and system interface functionality relevant to project and landscape-level planning.

INFORMS functional requirements analysis is virtually complete and has been used by cooperators as the design phase of the projects begins. The requirements document includes an entity relationship diagram (ERD), a function hierarchy, an ArcView-based rapid prototype, critiques of existing systems, and definitions of future needs. Established a cooperative agreement with Texas A&M University in conjunction with Region 8 Forest Health and the Ouachita National Forest and began developing the 615 version of INFORMS.

Value Determination Project Initiation—Initiated a program of value determination concerning forest pest impact and forest health. Focused on coordination with similar work in other units of the Forest Service, a review of concepts and relevant studies, and a user-driven technology transfer plan.

Participated in a national joint Forest Service—Natural Resource Conservation Agency Human Dimensions Workshop, and presented a paper at a regional forest economics meeting.

By means of a cooperative agreement with the University of Minnesota completed an extensive review of valuation theory and concepts in the natural resource management context. Completed and summarized a survey of studies of non-timber economic impact of forest pests. Initiated a cooperative agreement with Colorado State University to determine needs in forest health management for values information and the way those needs should be met.

Technical Support Services

Pest Model Maintenance and User Support—Provided maintenance and user support for western pest simulation models and their links to the FVS model variants.

Supported a training session for FVS and Pest Model Extensions, focusing on the Annosus Root Disease Model, in cooperation with Regions 5 and 6.

Significantly modified the western root disease, dwarf mistletoe, westwide pine beetle, and the Annosus root disease models. Assisted a group from Region 2 in making model runs for their planning session.

Review of Insect and Pathogen Model Utilization and Technology Transfer—Conducted a review of all aspects of model development, model support and maintenance, and future development goals to see if the models were meeting the user's needs. Information from completed surveys, phone conversations, and personal interviews was used in planning the FY 1996 Plan of Work for the modeling area.

Remote Sensing Services—During the summer of 1995 flew 11 remote sensing missions nationwide for a variety of Forest Service units and other agencies (Agriculture Research Service, Fish & Wildlife Service, and National Biological Service).

Rulebase Toolkit Management—Provided timely consultative and review assistance to Forest Health staff in Region 8 managing the TDP for the Rulebase Toolkit system.

Continued to monitor progress by Texas A&M University and to assist user sites in the use and testing of the Toolkit. Provided articles and graphics to Toolkit users to support various meeting presentations on the project. Coauthored and presented a paper entitled “A Knowledge-Based Reasoning Toolkit for Forest Resource Management.” Tested beta versions of the Toolkit, provided feedback to Texas A&M University concerning user requirements and design issues, and facilitated discussions and decision making on issues related to converting the Toolkit to the Project 615 platform.

Landscape-level Forest Health Analysis—Participated in the Region 1 TDP to develop and refine methodologies for conducting landscape-level forest health analyses which reflect the role of insects and pathogens in forest succession, and facilitated the dissemination and review of resulting methods among Regions and Area.

Digitized all needed spatial data. Completely processed data from two National Forests and began data processing for a third. Designed data structures to support project needs. Highlighted project results in several papers coauthored with Region 1 staff. Provided additional statistical and modeling expertise to Region 1 staff. Began early work to automate project components. Held meetings with Region 5 and 6 FHP staff to outline their future use of the developed methodologies.

Westwide Permanent Plot Database System—Provided support to the Pest Trend Impact Plot System (PTIPS) database development, applications, and uses. Progress continues on preparing further conversion/load routines, various statistical and analytical reports, and other user-requested enhancements.

Manufacture and Distribution of DFTM Traps—Consolidated orders, ordered materials, and arranged for approximately 7000 traps to be manufactured and shipped to the western Regions for the Douglas-fir tussock moth early warning detection system.

Technical Support Service to Washington Office in Information Management—Provided assistance to Washington Office in (1) collecting and managing pesticide use data and preparing the Pesticide-use Report for inclusion in the Annual Report of the Forest Service to meet congressional reporting requirements, (2) managing National Agricultural Pesticide Application Program (NAPIAP)-related information, (3) collecting data and developing the annual Pest Conditions Report, (4) preparing a national risk-rating map for the Forest Health Assessment Team and a map portraying FHP activities on other federal lands.

Training, Education, and Communication

Remote Sensing, Image Analysis, Geographic Information System (GIS), and Data Visualization Applications—Improved FHP’s ability to collect, analyze, and display forest health data by providing training, support, and leadership to FHTET, FHP field units, and domestic and international cooperators in the evaluation, use, and application of remote sensing, image processing, data visualization, and GIS technologies.

Developed hardware and software enhancements to the current airborne videography system under a cooperative agreement with Colorado State University, allowing automatic digitizing and geometric correction of airborne video images for use in forest health monitoring. In cooperation with Remote

Sensing Application Center (RSAC), began exploring the incorporation of a three-dimensional attitude sensor into the system to further improve the geometric accuracy of the resultant video mosaics.

Participated in demonstrations of geographic information systems, remote sensing, and data visualization technology to visitors from Regions 2, 6, and 8, New Zealand, Australia, Union Camp Corporation, Southern Research Station, and the Nature Conservancy. Provided assistance to Region 2 in image processing and to Regions 6 and 4 FHP in compiling information demonstrating data visualization projects. Participated in workshops and meetings related to spatial analysis training and visual simulation technology. Presented poster displays of airborne videography and data visualization technology at the Ecosystem Management Workshop, the Ecological Society of America Meeting, and the Western Forest Insect Work Conference.

By means of a cost-reimbursable agreement, assisted the People's Republic of China to purchase two airborne video systems and arranged for a U.S. team to travel to China to provide training and technical assistance in the use of these systems.

Remote Sensing Awareness and Training—Provided support and training to Region 2 FHP staff for photo interpretation of Forest Health Monitoring plot photography. Conducted training on airborne videography to staff members of The Nature Conservancy. Presented two papers and moderated a technical session at the 15th Biennial Workshop on Videography and Color Photography in Resource Assessment. Attended and participated in the National USDA Aerial Photography Meeting in Fort Worth, Texas, and in the Forest Service Annual Geomtronics Meeting in Albuquerque, New Mexico. Conducted a joint airborne video pilot project over Fort Bragg, North Carolina, in cooperation with Region 8 FHP and the U.S. Army to demonstrate and train video users in the use of the new automation modifications to the airborne video system on an operational mission.

Initiated a pilot project with the Stream System Technology Center to demonstrate and evaluate the utility of large-scale color and color infrared aerial photography and airborne videography as potential tools for assessing and monitoring stream conditions in a number of western sites.

Biometrics Training and Field Support—Provided analysis and comment for a white paper on nationwide mortality to be produced by the Washington Office. Information provided was used by the Resources Planning Act (RPA) staff to answer a congressional inquiry. Served as a member of the National 615 Statistics Software Review Team, coauthoring the report to the FS Chief Information Officer and a draft national acquisition RFI/RFP. Also participated in the ad-hoc FS Biometrician Coordination Group, working on issues of training, software support, and consulting.

FHP survey and analysis projects in Region 1, 2, 3, and NA. The Region 2 project was a landscape-level forest health study. Provided statistics and modeling expertise and assistance, and coauthored final report. Projects in Region 3 and NA were initiated in FY 1995 and will continue in FY 1996.

Demonstrations of Technology Applications—Assisted the field with presentations and also provided on-site demonstrations. Provided assistance to regions in presenting the rulebase poster at meetings and conferences. Held several demonstrations of INFORMS decision support system at Fort Collins.

Information Dissemination and Access—Provided technical support and conducted a technology transfer program to establish efficient utilization of global network service (i.e., Internet and World Wide Web resources) for forest health protection programs.

Extensively researched opportunities for information sharing, particularly in using the Internet and World Wide Web (WWW). Developed and shared many documents with FHP personnel across the Forest Service describing the use, capabilities, and resources available on Internet, and how to access them via the DG. Demonstrated Internet/WWW capabilities for Forest Pest Management/FHP/Forest Health Management and research units. Presented a poster and demonstration at the Western Forest Insect Work Conference.

Worked with Information Systems and Technology (IS&T) and the USDA Office of Information Resources Management (OIRM) to implement its strategy for interim Internet access through its Fort Collins office.

National Leadership and Coordination

Decision Support for Ecosystem Management—Represented decision support system needs and solutions sponsored through State and Private Forestry (S&PF) programs in Fire & Aviation Management (FAM) and FHP. Shared information with several groups that delve into assessments of current analysis technologies and ongoing systems development projects relevant to aiding decision-making processes for provincial, basin, forest, and project planning.

Modeling, Integrated Systems, and Remote Sensing Steering Committee—Provided a staff member to serve as chairperson for the Modeling, Integrated Systems, and Remote Sensing Technology Development Program Steering Committee.

Remote Sensing Steering Committee—Represented FHP on the Forest Service Remote Sensing Steering Committee to insure that FHP's remote sensing development and application activities are coordinated with other remote sensing activities within the Forest Service.

Information Resource Management and Support Systems Maintenance—Coordinated information resources management planning for Washington Office FHP, provided technical support for FHTET-shared computer systems, and coordinated FHP data collection and management activities with those of other Federal agencies. Participated in the completion of the Project 615 Implementation Strategy for the Washington Office Detached Units in Fort Collins (WOD-FC) and the Rocky Mountain Station.

FY 1995 Accomplishments

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership.

Objective # 3: Improve pest management delivery system at all levels.

Task: 1-3-A: Conduct review of current insect and pathogen model utilization and technology transfer to users/consumers.

Leader: Adams

The objective of this task was to review all aspects of model development, model support and maintenance, and future development goals. Model development, building a support/maintenance foundation, and setting up training sessions for insect and pathogen models have evolved over the past 10 years. Because of this length of time, the Forest Health Technology 2000 Analysis and Modeling Task Force Group initiated a review of the entire process. A number of fundamental changes, such as the increased size of areas under consideration by the Forest Service during planning and decision making, and the expansion of our capabilities by hardware technology, have taken place since the origin of insect and pathogen modeling began in FHTET-FC. These considerations led to a commitment by FHTET-FC to see if the models were meeting users' needs, to find out where improvements could be made, and to utilize the information derived in future planning efforts.

The review team, through a number of sessions, designed an outline of interest areas. This outline was broken down further into specific categories. A number of questions were formulated to obtain input from users to fill in the outline. A draft questionnaire was compiled and sent to a few individuals for review. Their comments and feedback were incorporated into the revised survey, which was distributed to all levels within the Forest Service as well as entomologists and pathologists working with universities, state forestry offices, and private industry.

The results of completed surveys together with information from phone conversations and personal interviews were compiled and have been beneficial in drafting the modeling activities described in the FY 1996 Plan of Work.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-B: Serve as chairperson for Modeling, Integrated Systems, and Remote Sensing Steering Committee.

Principal Cooperators:

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Leader: Janiga

The objectives of this task were: (1) to serve as chairperson for Modeling, Integrated Systems, and Remote Sensing Technology Development Program Steering Committee, and (2) to share information among seven other TDP steering committees.

Two meetings were convened (one via conference call) in order to update the tactical plan for modeling, integrated systems, and remote sensing technology development objectives for Forest Health programs nationwide. Preliminary project proposals being considered in each region were described and reviewed by the committee in order to identify opportunities for coordination and supplemental funding available through programs other than TDP. Priority projects were identified and provided to the manager of the national Technology Development Program.

After the committees were designated "self-directed work groups," the committees' chairpersons asserted additional responsibility for self-directed improvement of committee coordination and operations. The chairpersons of other steering committees relevant to Forest Health Protection programs convened in order to share findings and recommendations from various technical discussions and activities as well as to discuss opportunities for improving committee and technology development activities. The recommendations will be followed through during fiscal year 1996.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-C: Continue representation of State and Private Forestry needs and initiatives through participation in and support of the Executive Committee for Ecosystem Management.

Principal cooperators:

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Leader: Janiga

The objectives were (1) to represent decision support system needs and solutions sponsored through S&PF programs in FAM and FHP, and (2) to share information with several groups that delve into assessments of current analysis technologies and ongoing systems development projects relevant to aiding decision-making processes for provincial, basin, forest, and project planning.

The cooperators designated Doug Fox as lead for activities representing decision support system development project teams. The Inter-Regional Ecosystem Management Coordinating Group delegated responsibility to Todd Mowrer to manage synthesis of "What questions need to be addressed in regional/provincial planning?" and "What technologies exist in the Forest Service to address these questions?" Information pertinent to work sponsored by S&PF was contributed to these groups.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-D: Represent FHP through participation in the Forest Service Remote Sensing Steering Committee.

Principal Cooperators:

Doug MacCleery
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Washington, D.C.

Henry Lachowski
USDA-Forest Service
Nationwide Forestry Applica-
tions Program
Salt Lake City, UT

Chris Topic
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WO-Wildlife
Washington, D.C.

Bill Ubbens
USDA Forest Service
WO-IS&T
Washington, D.C.

Gyde Lund
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Dave Winn
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Stan Bain
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WO-Range
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Tom King
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WO-Minerals & Geology
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Andre Coisman
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WO-Engineering
Washington, D.C.

Jerry Stokes
USDA-Forest Service
WO-Recreation
Washington, D.C.

Julia Morris
USDA-Forest Service
WO-International Forestry
Washington, D.C.

Leader: Pywell

The objective was to ensure that FHP's remote sensing development and application activities were coordinated with other remote sensing activities within the Forest Service. FHTET-FC represented FHP on the Forest Service Remote Sensing Steering Committee. Personnel attended the semi-annual steering committee meetings in Denver, Colorado (November 1994) and Washington, D.C. (September 1995). Committee work focused on providing guidance and direction to the Integration of Remote Sensing Project at RSAC and reviewing proposals from the field for remote sensing applications work at RSAC.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-E: Represent Forest Health Protection through participation in data standards committees and national geographic data management initiatives.

Principal Cooperators:

Federal Geographic Data Committee and Subcommittees

Leader: Pywell

The objective was to ensure coordination of FHP data collection and management activities with those of other Federal agencies.

No relevant meetings occurred.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-F: In cooperation with Forest Health Protection (FHP) Washington Office (Martin), Fire & Aviation Management Washington Office (Handley), Forest Management Service Center, Rocky Mountain Station, and Ecosystem Analysis Center, participate in Project 615 pilot testing and disseminate pertinent information and results to FHP field units.

Principal Cooperators:

Rocky Mountain Forest and Range Experiment Station Computer Services Staff 240 West Prospect Road Fort Collins, CO 80526-2098	Washington Office Detached Units: Timber Management Service Center 3825 E. Mulberry St. Fort Collins, CO 80524 Ecosystem Management Analysis Center 3825 E. Mulberry St. Fort Collins, CO 80524	Range 3825 E. Mulberry St. Fort Collins, CO 80524 Procurement and Purchasing 3825 E. Mulberry St. Fort Collins, CO 80524 Timber Sale and Accounting 3825 E. Mulberry St. Fort Collins, CO 80524
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Leader: Roschke

The objectives of this task were to ensure that FHTET-FC has access to Project 615 equipment and support during the pilot year, and to plan for a coordinated and balanced procurement of equipment which will serve all of the Washington Office Detached Units located in Fort Collins.

The Project 615 contract was initially awarded to IBM in FY 1994, but protests from other vendors delayed the implementation of the contract until mid-FY 1995. Once the protests were resolved, FHTET-FC staff represented the WOD-FC at the Project 615 kickoff meeting, where implementation planning for the Forest Service was begun. Project 615 information from the meeting was provided to FHTET-FC staff and cooperators; the Ecosystem Management Analysis and Timber Management Service Centers in Fort Collins; Jayne Handley, the S&PF Project 615 coordinator in Washington, D.C.; and the USDA OIRM staff in Fort Collins. FHTET-FC staff assisted in the completion of the Project 615 Implementation Strategy for the Rocky Mountain Station. The initial IBM/615 order for WOD was received and installed, is being configured, and is nearly ready for use. Additional Local Area Network (LAN) capacity has been added to accommodate the new equipment. A second IBM/615 order for mission-critical equipment to augment current capabilities was placed in September in coordination with the other WOD; receipt is expected within two to three months.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 3: Improve pest management delivery system at all levels (continued).

Task # 1-3-G: Provide technical support and conduct a program of technology transfer to establish efficient utilization of global network services (i.e., Internet and World Wide Web resources) for insect and pathogen management programs. Provide FHTET-FC services to related Technology Development Projects.

Principal Cooperators:

Northeast Area, WO-FHP, Pacific Northwest Region, Finnish Forest Research Institute

Leader: Roschke

The objective of this task was to provide technical support and to conduct a program of technology transfer to establish efficient utilization of global network service (i.e., Internet and World Wide Web resources) for Forest Health Protection programs.

FHTET-FC extensively researched opportunities for information sharing, particularly in using the Internet and World Wide Web (WWW). FHTET-FC staff have developed and share many other documents with FHP/FHM personnel across the FS describing the use, capabilities, and resources available on Internet, and how to access them via the DG. FHTET-FC has demonstrated Internet/WWW capabilities for several FHP/FHM and research personnel. FHTET-FC presented a poster and live demonstration at the Western Forest Insect Work Conference, and organized a WWW demonstration by Dr. Hannu Saarenmaa for Fort Collins personnel. With the NA and the Finnish Forest Research Institute (METLA) as cooperators, FHTET-FC developed a TDP for providing Internet services for Forest Health Protection. FHTET-FC worked with IS&T, Public Affairs Office (PAO), the NA, METLA, the Rocky Mountain Station, and USDA Office of Information Resources Management (OIRM) in planning and providing Internet information services.

FHTET-FC worked with IS&T and the USDA OIRM to implement its strategy for interim Internet access through OIRM-FC. A separate LAN (not connected to the FS corporate systems) was installed to support this capability; techniques for connecting to multiple LANs have been explored and developed. The Internet LAN is in use by FHTET-FC staff and is available for use by WOD and other units in the building. Equipment necessary to provide information services through the Internet has been installed and is currently being configured. Planning is underway for developing Internet services related to FHTET-FC and Forest Health, and for an Internet workshop for FHP personnel.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems.

Task # 1-5-A: Manage database development, revisions, and technical training for the west-wide permanent plot database system.

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Leader: Adams

The Pest Trend Impact Plot System (PTIPS) was initiated as a method to validate insect and disease models, to install a series of permanent plots, and to create a common database structure. A common structure that would ease the problems of data management and facilitate the sharing of data had been recognized as a fundamental need for many years.

The objective of this task was to support the PTIPS database, applications, and users. Today, the PTIPS database and application software has been installed at regional offices. A menu-driven system provides data load routines, data entry screens, validation queries, and reports. Progress continues on preparing further conversion/load routines, various statistical and analytical reports, and other user-requested enhancements.

Informational exchange meetings, including demonstrations, were conducted in Las Vegas, NV and Ft. Collins, CO. Participants included Chuck Liff, Environmental Protection Agency (EPA), and other members of the development team for the Most Excellent Software System (MESS) along with developers of PTIPS. It was beneficial for everyone to review the progress to date on both of these tasks.

The Washington Office Timber Management Service Center (WO-TMSC) has agreed to manage the database in Fort Collins. Cooperative efforts continue in an attempt to merge the ALLVEG and PTIPS database structures.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems (continued).

Task # 1-5-C: Provide assistance to WO Pesticide Use Management & Coordination (PUM&C) (Thomas) to collect and manage pesticide use data. Assist PUM&C in composing a project proposal for improving pesticide use data collection, reporting, and analysis in order to provide information necessary for WO to determine appropriate actions and budgetary investments in pesticide use data management. Provide assistance to PUM&C for the management of NAPIAP-related information.

Principal cooperators:

Dave Thomas	Paul Mistretta
USDA Forest Service, FHP	USDA Forest Service, FH
14th & Independence, SW	1720 Peachtree Road, NW
P.O. Box 96090	Room 925N
Washington, DC 20090-6090	Atlanta, GA 30367

Leader: Roschke

The objectives of this task were (1) to provide assistance to WO PUM&C (Dave Thomas) to collect and manage pesticide use data and to prepare the Pesticide-Use Report for the Annual Report of the Forest Service in order to meet congressional reporting requirements, and (2) to provide assistance to WO PUM&C for the management of NAPIAP-related information.

FHTET-FC completed and delivered the Pesticide Use Report for the 1994 Annual Report of the Forest Service to PUM&C for final review and publication. FHTET-FC prepared estimates of resource needs for enhancing pesticide use reporting and tracking capabilities for PUM&C. FHTET-FC personnel discussed NAPIAP direction with Dave Thomas.

Arrangements were made to transfer the responsibility for completing the Annual Report to FHTET-FC. Dave Thomas in Washington D.C. will retain the responsibility for oversight, final approval, and providing pesticide-related subject matter expertise, including verification of data received from Regions/Stations/Area, with additional assistance from Paul Mistretta, Pesticide Coordinator in Region 8. The call letter for Pesticide-Use Reports was prepared at FHTET-FC, submitted to Dave Thomas for WO review and concurrence, and issued to Regions/Stations/Area staff for the FY 1995 report.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems (continued).

Task # 1-5-D: Sustain an information resources management program for support of Washington Office by maintaining the annual Information Resources Management (IRM) plan and FHTET-shared support systems.

Principal Cooperators:

Leader: Roschke

The objectives are to coordinate information resources management planning for Washington Office FHP, and to provide technical support for FHTET-FC shared computer systems.

FHTET-FC staff assisted in assessing, selecting, and utilizing various information systems technologies and in resolving other technical questions as requested. Staff collected comments, needs, suggestions, and other information from FHP staffs in Davis, Morgantown, Fort Collins, and Washington, D.C., and produced the WO-FHP FY 1995 Information Resource Management Plan for submission to IS&T.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems (continued).

Task # 1-5-E: Arrange for the manufacture and distribution of pheromone traps to continue the Douglas-fir tussock moth early warning system.

Principal Cooperators:

FHP, Regions 1-6, and States in these Regions

Leader: Scrivner

The objective of this project was to provide a service to the western Regions participating in the Douglas-fir tussock moth early warning detection system.

This system was implemented in 1978 as a management tool for focusing attention on potential trouble spots in the forest. Except during outbreaks, the Douglas-fir tussock moth is difficult to detect. Tree damage can occur before the forest manager is even aware there is an outbreak. To help alleviate this problem, the early warning system uses traps baited with a synthetic pheromone. The traps capture male tussock moths in late summer and early fall. The number of moths caught is an indication of the number of larvae that will be present the following spring and the subsequent potential for defoliation.

FHTET-FC consolidates the orders, orders materials, and arranges for approximately 7000 traps to be manufactured and shipped to the field each year.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems (continued).

Task # 1-5-F: Manage data repository and reporting of insect and pathogen reports acquired by the WO for summarization and inclusion in the Annual Report of the Forest Service.

Principal Cooperators:

WO, Regions

Leader: Scrivner

The objective of this task was to update the Forest Pest Information System (FPIS) Oracle database once during FY 1995 with annual pest information. FPIS is an application designed to assist Forest Service personnel during the development of annual insect and disease conditions reports. Insect and disease information is entered into a database, and detailed reports are generated.

Every year FHP in Washington sends a request to all the Regions requesting pest impact information that will be used in the annual Forest Insect and Disease Conditions in the United States report. After the information is received and reviewed, it is forwarded to the FHTET-FC staff for entry into FPIS. FHTET-FC inputs the data into the database and runs the reports that are submitted to the WO. The summary reports include: Pest Occurrence for each Region; Pest Occurrence for each State; Pest Occurrence National Summary; Data Exception Report; Area History National Summary; and Volume History National Summary. Reports were submitted to the WO by June of 1995.

Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).

Objective # 5: Develop, update, and/or improve information data gathering systems (continued).

Task # 1-5-G: Maintain the Forest Health Protection Remote Sensing Service Support.

Principal Cooperators:

Region 2	Region 2	Rocky Mt. Station
Fiscal staff	Aviation Management staff	Budget and Finance staff
Denver, CO	Denver, CO	Ft. Collins, CO

Plus all the various customers and users of this service.

Leader: Myhre

The objectives of this task were: (1) to provide remote sensing service and support to FHP field organizations, (2) to provide aerial photography and videography image acquisition products, (3) to provide an aerial platform (USFS Beechcraft King Air) for development and testing of new remote sensing equipment and techniques, and (4) to conduct evaluations and demonstrations for new applications.

This service/support activity is operated by the Remote Sensing Service Team (RSST). The RSST established a special account at the Rocky Mountain Station to receive and disburse funds for RSST operations. Region 2 Aviation Management provided the remote sensing pilot and oversaw the aircraft maintenance activities.

All customers/users of this program were provided a total service package which included mission planning, preparation of flight maps, acquisition of imagery, purchasing and processing of film, index maps of photo/video coverage, and delivery of end products. Most of the RSST operating costs were covered by enterprise funds received from customers.

Eleven remote sensing missions were flown nationwide during the summer of 1995 for a variety of Forest Service units, plus other agencies (Agriculture Research Service, Fish & Wildlife Service and National Biological Service).

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management.

Task # 1-6-A: Complete requirements analysis for decision support needs and system interface functionality relevant to forest health agents at the project and basin planning levels. Compile information suitable for developing decision aides responsive to decision criteria and integrate insect and pathogen information into ecosystem management planning processes.

Principal Cooperators:

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Forrest Oliveria, Entomologist Alexandria Field Office Forest Health Protection, USDA Forest Service		

Leader: Adams

The objective of this task was to conduct requirements analysis for pest model interfaces.

Submittal system development efforts are continuing in cooperation with Intermountain Station and British Columbia. The prototype development will be used to gain feedback from users. This information will be utilized for future development projects.

Leader: Williams

The objective of this task was to complete a detailed requirements analysis for decision support needs and system interface functionality relevant to project and landscape-level planning.

INFORMS functional requirements analysis is virtually complete and has been used by cooperators as the design phase of the projects begins. The requirements document includes an entity relationship diagram, a function hierarchy, an ArcView-based rapid prototype, and various other chapters which both critique existing systems and define future needs. A cooperative agreement with Texas A&M in conjunction with Region 8 Forest Health and the Ouachita National Forest was established, and the development of the 615 version of INFORMS, using this requirements document as a guide, is underway.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-B: In cooperation with Washington Office-Timber Management Service Center, Intermountain Station, Rocky Mountain Station, Regions, and universities, provide maintenance and user support for western pest simulation models and their links to the Forest Vegetation Simulator (FVS) model variants.

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Leader: Adams

The objective of this task was to provide support for the pest simulation models with programming and technical transfer assistance. As the insect and disease models have come into production, technology transfer has become a very important segment of the support and maintenance process.

FHTET-FC supported a training session for FVS and Pest Model Extensions, focusing on the Annosus Root Disease Model, in cooperation with Regions 5 and 6. A programmer was sent to assist with the training, and appropriate documentation was compiled and sent to the training site. Documents and training visuals, in the form of overheads and slides, were sent to Region 6 instructors. Training materials were also provided for a Dwarf Mistletoe session conducted at CSU by Brian Geils, Rocky Mountain Station.

Significant modifications were made to the Western Root Disease, Dwarf Mistletoe, Westwide Pine Beetle, and the Annosus Root Disease models. FHTET-FC also assisted a group from Region 2 in making model runs for their planning session.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-C: Coordinate multi-agent modeling work conducted by research stations, the FHTET-Morgantown, FHTET-Fort Collins, and Technology Development Projects in order to follow through on recommendations posed in the 1992 Report for Forest Health modeling and the Forest Health Technology 2000 plan.

Principal Cooperators:

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Leader: Adams

The objective of this task was to continue making progress developing a multi-pest model by proceeding with the short-term and interim strategies of modeling high-priority pest complexes described in the 1993 strategic plan for developing multiple pest models. Three alternatives were recommended with varying durations in time. The short-term, interim, and long-term strategies are complementary and support parallel progress within each area.

The Annosus Root Disease Model and the Combined Root Disease Model are currently in development using the framework of existing models, with the introduction of multiple pest interaction. The Westwide Pine Beetle Model also has a limited set of pest interactions, and also encompasses a broader geographic scope.

We received the Combined Root Disease Model prototype, along with the documentation noting the differences between the single and the multi-pest model. Work on the User's Guide has begun; it will include examples from Canada and the United States. One document will be developed and maintained for all users. The Annosus Root Disease User's Guide and Model Description was sent out in draft form for review, finalized, and then distributed to users. The model is currently being tested in Region 5. The Westwide Pine Beetle Model has been modified and is currently in beta test mode.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-D: Upon completion of the Annosus Root Disease Model revision, sustain model code and documentation for dissemination and use by field personnel.

Principal Cooperators:

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Leader: Adams

The objective of this task was to support the Annosus Root Disease Model revision and its documentation through the final development phase. Modifications have been made to the model since its initial receipt and placement on the DG. The updates will be ongoing as the model continues through beta testing.

The Annosus Root Disease User's Guide and Model Description was sent out for review to the development team members. Once the document was finalized, it was distributed to all participants. As the model is used more extensively, changes will be made to the program, and users will be notified through the bulletin system.

A training session was conducted in the fall as an introduction of the model to Region 5 users. Assistance from FHTET-FC was provided in the form of instruction materials, and a computer programmer was sent to this session to provide an overview of other models and their availability.

FHTET-FC has made a commitment to help Region 5 and 6 with the validation and calibration of this model.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-E: Sustain the Dwarf Mistletoe Model code and develop documentation upon completion of model development and sensitivity analyses for this Technology Development Project.

Principal Cooperators:

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		John Guyon R4-FPM 4746 S. 1900 E Ogden, UT 84403

Leader: Adams

The object of this task was to support the Dwarf Mistletoe Model and the corresponding documentation through the final development phase. The Dwarf Mistletoe Impact Modeling System User's Guide and Reference Manual was released to a core group for review. After the document was finalized, it was distributed to everyone who participated in development workshops. A conference call was held to discuss publishing papers in a variety of journals. There were several aspects of the Dwarf Mistletoe Model that the participants felt should be subject areas of articles. The model is undergoing modifications and updates as testing continues in various Regions and Canada.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-F: Sustain the White Pine Blister Rust Model code and develop documentation upon completion of model development and sensitivity analyses for this Technology Development Project.

Principal Cooperators:

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Leader: Adams

The objective of this task was to support this model and the corresponding documentation through the final development phase. The White Pine Blister Rust Model is being tested in Regions 1 and 6. Computer Programming support has been provided throughout this testing phase for modifications and consultation.

Statistical support for the White Pine Blister Rust Model sensitivity analysis has been cancelled for this fiscal year.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-G: On site, in the field, and at conferences, conduct demonstrations of technology applications produced by FHTET-FC. Produce poster displays and assist field personnel in development of informational packages, papers, and posters for promotion of insect and disease information and analyses supporting ecosystem management decision processes and criteria.

Leader: Adams

The objective of this task was to assist the field with presentations and also to provide on-site demonstrations.

FHTET-FC provided assistance to regions in presenting the rulebase poster at meetings and conferences.

Demonstrations of INFORMS decision support system were held throughout the year at Fort Collins. This included a brief overview of the system, the history of its development, and where future development efforts will be focused. Computer demonstrations of INFORMS were conducted several times for guests.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-H: In cooperation with Regions/Area and RSAC evaluate new sensor technologies, such as multi-spectral video and digital photographic systems, for forest vegetation stressor detection.

Principal Cooperators:

Tom Bobbe/Paul Ishikawa	Bill Frament	Andy Knapp
W.O. Engineering	Northeastern Area	Region 4
Remote Sensing Application	Forest Health Protection	Forest Health Protection
Center	Durham Field Office	Boise Field Office
Salt Lake City, UT	Durham, NH	Boise, ID

Leader: Myhre

The objective was to evaluate new sensor technologies such as multi-spectral video and digital photographic systems for forest vegetation stressor detection applications, in cooperation with FHP Regions/Area and RSAC.

In cooperation with RSAC, the new digital color infrared camera was evaluated over hardwood health sites in Vermont in early August in conjunction with the Hardwood Health Survey flown for NE Area/FHP. The camera was also used to collect imagery over several types of forest health problems in Region 4. The preliminary results from these flights are very promising. A more detailed analysis of this imagery will be conducted this winter.

RSAC has purchased a camera for FHTET. This will permit a more extensive evaluation of this camera technology by FHP field units next summer.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-I: In cooperation with the Rocky Mountain Region and Colorado State University, develop vegetative cover database of Colorado from Landsat imagery for conducting broad-scale ecosystem management analysis.

Principal Cooperators:

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Denis Dean
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Fort Collins, CO

Leader: Pywell

The objective was to produce a vegetative cover database from Landsat imagery covering the State of Colorado that is suitable for conducting broad-scale ecosystem assessments and that may also provide data on insect and disease host type for Colorado. FHTET-FC's role is to provide both image processing and contracting expertise.

During FY 1995, FHTET-FC has established a challenge cost-share agreement with the Department of Forest Science at Colorado State University. The cooperators have met and developed the vegetative classification system to be used in the project. The University has acquired the Landsat imagery and completed processing the data. The cooperators have met and reviewed the preliminary products, and revision of the products has been initiated by the University.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-J: In cooperation with Regions 3, 4, 6, and 10, the Intermountain Station, the Universities of Arizona and Illinois, and Texas A&M University, continue development of data visualization capabilities to display pest impacts and forest management alternatives, ensuring compatibility with the Forest Vegetation Simulator and INFORMS.

Principal Cooperators:

Brian Orland Dept. of Landscape Architecture University of Illinois	John Wells USDA-Forest Service WO-Timber Management Washington, D.C.	Brian Ferguson USDA-Forest Service Dixie National Forest 82 N. 100 E. St. P.O. Box 580 Cedar City, UT 84721-0580
Terry Daniel School of Renewable Natural Resources University of Arizona	Steve Munson USDA-Forest Service Region 4, FHP 4746 S. 1900 E. Ogden, UT 84403	Nick Crookston USDA-Forest Service INT Research Station 1221 S. Main St. Moscow, ID 83843

Leader: Pywell

The objective of this task was the development of data visualization capabilities to display the effects of pest impacts and forest management alternatives on the landscape in a form and context understandable to our publics and managers.

Over the past four years, FHP has been involved in data visualization development activities in Regions 3, 4, 6, and 10. In addition, FHP was cosponsor of a Data Visualization Workshop held in La Vegas, NV which resulted in a long-term research agenda for data visualization. The Forest Health Technology 2000 Task Force has identified information display/data visualization as a major focus area. This task moves FHP along the development track outlined in those documents.

A memorandum of understanding between the Forest Service and cooperating universities has been signed. A cooperative agreement between FHP/FHTET-FC and the University of Illinois has been executed. This agreement provides for the development of data visualization capabilities for: (1) creating visualizations based on stand data; (2) generating visualizations from the output of growth and pest models; (3) developing links between stand databases, the FVS, and the visualization models; (4) developing links between the data visualization capability and INFORMS; and (5) developing a capability to produce landscape-level visualizations in support of ecosystem management.

FHTET-FC has installed and run the current version of SmartForest II on a Project 615-like platform. FHTET-FC facilitated a meeting between SmartForest II and FVS developers for the purpose of

communicating their systems' data structures and development philosophies, with the goal of integrating the functionality of the two systems.

Work has begun to incorporate the data visualization software into the ARC/View product. ARC/View is a geographic data front-end and interface in the Project 615 environment. A meeting was held with the Universities of Illinois and Arizona, FHTET-FC, and Washington Office Timber Management to outline FY 1996 work activities and priorities, and to plan a briefing of WO personnel on data visualization activities and capabilities. Installation of the data visualization software (SmartForest II) on the Dixie National Forest is planned for FY 1996.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-K: Through the Advanced Technology Lab, provide training, support, and leadership to FHP units and both domestic and international cooperators in the use and application of remote sensing, image processing, GIS, and data visualization technologies.

Principal Cooperators:

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Tom Bobbe
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Leader: Pywell

The objective of the task was to improve our ability to collect, analyze, and display forest health data by providing training, support, and leadership to FHTET-FC, FHP field units, and domestic and international cooperators in the evaluation, use, and application of remote sensing, image processing, data visualization, and GIS technologies.

As Project 615 is implemented over the next several years, many advanced analytical tools will be available to FHP field units. The success of this implementation will depend, to a large degree, on having field personnel experienced in the use of these tools. One of the tasks of the Advanced Technology Lab will be to work with field units and other cooperators in cooperative projects to evaluate advanced technology tools, to determine how these tools can best be applied to FHP problems, and to train field personnel in the use and application of these tools. This includes short-term

projects, technical assistance, training sessions, and technology development projects through cooperative special project funding.

During FY 1995 FHTET-FC developed hardware and software enhancements to the current airborne videography system under a cooperative agreement with Colorado State University, allowing automatic digitizing and geometric correction of airborne video images for use in forest health monitoring. The software has been installed and tested on a Pentium PC system at FHTET-FC. Based on testing performed by the National Forests in Texas we found that installation of the new hardware was not a completely fool-proof process. As a result of this feedback, we have modified the hardware to make it easier to install. In cooperation with RSAC, we have begun exploring the incorporation of a three-dimensional attitude sensor into the system. This will further improve the geometric accuracy of the resultant video mosaics. A PhD dissertation documenting the development, accuracy, use, and cost savings from this system has been produced and will be converted into a FHTET-FC Technical Report in FY 1996.

FHTET-FC staff have participated in demonstrations of geographic information systems, remote sensing, and data visualization technology to visitors from Regions 2, 6, and 8; New Zealand; Australia; Union Camp Corp.; Southern Research Station; and the Nature Conservancy. FHTET-FC staff have provided assistance to Region 2's Geometronics lab in image processing and to Regions 6 and 4 FHP with the compilation of information demonstrating data visualization projects. The staff have participated in workshops and meetings related to spatial analysis training and visual simulation technology. FHTET-FC staff presented poster displays of airborne videography and data visualization technology at the Ecosystem Management Workshop, the Ecological Society of America meeting, and the Western Forest Insect Work Conference.

We have assisted in the purchase of two airborne video systems for the People's Republic of China and are preparing to travel to China to provide training and technical assistance in the use of these systems. FHTET-FC's GIS lab is also providing support to two Washington Office projects: a national risk-rating map for the Forest Health Assessment Team and a map portraying FHP activities on other federal lands.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-L: In partnership with Regions, Area, Research, and National Forest System units, conduct review of resource and ecosystem process models to ascertain how pest impact information can be integrated with other resource programs.

Principal Cooperators:

Rich Teck
Forest Management
Service Center
USDA Forest Service, NFS
Ft Collins, CO

Colin Hardy,
Elizabeth Reinhardt
Fire Effects Project
Intermountain Station
USDA Forest Service, Res
Missoula, MT

Charles Grier, Head;
Frederick Smith;
David Betters
Dept. of Forest Resources
Colorado State University
Ft. Collins, CO

Joyce Thompson
Ecosystem Management
Analysis Center
USDA Forest Service, NFS
Ft Collins, CO

Leader: Smith

The objective of this task was to review non-timber resource models and ecosystem process models to ascertain how pest impact information can be integrated into them. The resource models are reviewed with the consideration of linking them to the FVS and existing pest impact models.

A cooperative agreement with Colorado State University achieved the primary objective of this task. The resource model review was done jointly by the FHTET staff and the University, including an extensive polling of Forest Service personnel in various resource staffs and in all Regions concerning the models they actually used. The results of the resource model review were provided to the Ecosystem Management Analysis Center in a format compatible with their existing model data base. Two extensive review documents were produced.

Additional accomplishments beyond those planned were made by advancing FVS models. The FHTET staff cooperated in two resource model extensions of FVS, one for wildlife snag habitat and the other for fire management. The fire management model was based on FHTET's Westwide Pine Beetle Model and was designed to operate in conjunction with it. Results of the ecosystem process model review will be used to evaluate possible stand stress modeling approaches in the FY 1996 program.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-M: In cooperation with Region 5 and the University of California, design and perform validation and calibration studies on the Westwide Pine Beetle Model.

Principal Coordinators:

Tom Gregg	David Wood	George Ferrell
Forest Pest Management, PNW Region	University of California, Berkeley	Management of Competing Vegetation, PSW Station
USDA Forest Service, S&PF	Berkeley, CA	USDA Forest Service, Res.
Portland, OR	Pat Shea	Redding, CA
	Chemical Ecology of Forest	
Willis Schaup	Insects, PSW Station	
Forest Health Management, R-2	USDA Forest Service, Res.	
USDA Forest Service, S&PF	Davis, CA	
Lakewood, CO		

Leader: Smith

The project objective was to test the Westwide Pine Beetle Model behavior against historical data sets and expert opinion. The model was constructed using data on mountain pine beetle, primarily in lodgepole pine. Validation needs to be done on western pine beetle and jeffery pine beetle in ponderosa and jeffery pine.

Data from Pacific Southwest Forest and Range Experiment Station was obtained for the Black's Mountain Experimental Forest. Stand data was digitized and preliminary data preparation was done to build simulation files. Criteria for testing results and test scenarios were constructed in cooperation with Dr. David Wood, University of California, Berkeley. Simulation runs were postponed until an interface consistent with 615 can be developed.

Original plans called for a custom interface. The inclusion of ARC/View II in 615 made it desirable to use that software as the model display standard. A session was held at the Western Forest Insect Work Conference describing the model.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-N: In cooperation with Region 6 and Rocky Mountain Station, continue assistance to the Technology Development Project for simplifying input requirements and reduction of model complexity for the Western Spruce Budworm Population Model.

Principal Cooperators:	Dick Mason	Ann Lynch
Kathy Sheehan, Tom Gregg	Protection of Forest Health and	Pest Impact Assessment Tech-
Forest Pest Management, PNW	Productivity, PNW Station	nology, Rocky Mountain
Region	Forest Pest Management, PNW	Station
USDA Forest Service, S&PF	Region	USDA Forest Service, Res
Portland, OR	USDA Forest Service, Res	Fort Collins, CO
	La Grande, OR	

Boyd Wickman
Environmental Health and
Protection, PNW Station
USDA Forest Service, Res
Bend, OR

Leader: Smith

The objective of this task was to create a defoliation model for western spruce budworm based on a revision of the existing population dynamics model. The existing population model was produced by the CANUSA program in the 1980s. That program was ended before a workable model could be implemented. This project was initiated with a Technical Development Project sponsored by Region 6. FHTET-FC provided modeling and programming expertise and will be responsible for implementing the model in the FVS.

Model design and review sessions were conducted with cooperators from FHTET-FC, FHP (Regions 4 and 6), and Forest Insect and Disease Research (Pacific North West, Rocky Mountain). Program coding was nearly complete by the end of FY 1995; it was subsequently finished in the first half of FY 1996. Program documentation and testing will be jointly done by FHTET-FC and Region 6 in FY 1996. The model is designed to be suitable as the basis for a generalized western defoliator model. It incorporates a structure which can be extended to multi-stand, landscape analysis. Such capabilities will be practical with 615 implementation. Staff also completed analysis of a proposed revision of the Douglas-fir Tussock Moth Model and coauthored two publications on this effort, led by Region 6.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-Q: Develop and refine methodologies for conducting landscape-level forest health analyses. Participate in Region 1 Technology Development Project and ensure dissemination and review of resulting methods among all Regions and Area.

Principal Cooperators:

Susan Hagle	Jim Byler, Group Leader
Plant Pathologist	Coeur d'Alene Field Office
USDA Forest Service	USDA Forest Service
Pattee and Pine	3815 Schreiber Way
Missoula, MT 59807	Coeur d'Alene, ID 83814

Leader: Williams

The objective of this task was to develop and refine methodologies for conducting landscape-level forest health analyses which reflect the role of insects and pathogens in forest succession. This task involves participating in a Region 1-sponsored TDP and ensuring the dissemination and review of resulting methods among all Regions and the Area.

All needed spatial data have been digitized. Data from two National Forests have been completely processed, and data processing for a third is underway. Data structures have been designed to support project needs and will facilitate more efficient processing of data for the remaining National Forests. Early project results were highlighted in a second paper coauthored by Sue Hagle, Sandra Kegley, and Stephen Williams. A third paper is being written which documents spatial data preparation and GIS techniques used. Acquisition of Project 615 equipment and a notebook PC was completed and transition of equipment with project data and summary routines to Region 1 is underway. Additional statistical and modeling expertise was provided to Region 1 staff. Early work to automate components of the project has begun. Meetings were held with Regions 5 and 6 Forest Health staff to outline future use of the developed methodologies by these regions.

- Goal # 1: Maximize forest pest management efficiency while minimizing adverse environmental and social impacts on lands of all ownership (continued).
- Objective # 6: Encourage application of new technology developed by research to enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 1-6-R: Provide timely consultative and review assistance to Region 8 personnel managing the Technology Development Project for the Rulebase Toolkit system.

Principal Cooperators:

Forrest Oliveria
Entomologist
Alexandria Field Office
Forest Health Protection,
USDA Forest Service
2500 Shreveport Highway
Pineville, LA 71360

Ron Perisho
NEPA Coordinator
Jessieville Ranger District
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Jessieville, AR 71949

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Operations Research
Analyst
Ouachita National Forest
Federal Building
Hot Springs, AR 71902

Douglas Loh
STARR Lab, Dept. of Range
Management and Ecology
Texas A&M University
College Station, TX 77843

Leader: Williams

The objective of this task was to provide timely consultative and review assistance to Forest Health staff in Region 8 managing the TDP for the Rulebase Toolkit system.

FHTET-FC continued monitoring progress by Texas A&M and assisting user sites in the use and testing of the Toolkit. We also provided articles and graphics to Toolkit users to support various meeting presentations on the project, coauthored and presented a paper entitled "A Knowledge-Based Reasoning Toolkit for Forest Resource Management", tested beta versions of the toolkit, and provided feedback to Texas A&M concerning user requirements and design issues. In addition, we facilitated discussions and decision making on issues related to converting the Toolkit to the Project 615 platform.

Goal # 2: Maximize internal and public trust in Forest Service pest management programs.

Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Health Protection to meet Forest Service commitment to integrated pest management.

Task # 2-1-A: Provide editorial and distribution support to the Washington Office and FHTET-FC program literature through technical editing support, publication, and dissemination of digital documents through global networks.

Principal Cooperators:

Joan McAndrew	Dick Fowler
USDA Forest Service	USDA Forest Service
Forest Health Protection	Forest Health Protection
Washington Office	Washington Office
Washington, D.C.	Washington, D.C.

Leader: Janiga

The objective of this task was to provide editing services to Washington Office, Forest Health Protection, with Patrice Janiga serving as the contract officer's representative for these contracted services.

The report titled, *Appendices to the Forest Health Strategic Plan*, was edited.

Goal # 2: Maximize internal and public trust in Forest Service pest management programs (continued).

Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 2-1-B: Improve awareness of FHTET-FC remote sensing and data visualization capabilities by providing training for airborne videography, photo interpretation, and image analysis.

Principal Cooperators:

David Johnson
Region 2
Forest Health Protection
Denver, CO

John Knighten
Region 8
Forest Health Protection
Asheville, NC

Larry Schmidt
Stream System Technology Center
Rocky Mt. Station
Ft. Collins, CO

Roger Sayre, Andrea Cristofani
The Nature Conservancy
Arlington, VA

Bruce Silvey
Region 8
Forest Health Protection
Lufkin, TX

Jule Caylor
W.O. Engineering
Remote Sensing Applications Ctr.
Salt Lake City, UT

Leader: Myhre

The objectives of this task were: (1) to improve awareness of remote sensing technologies and capabilities within FHP, with other Forest Service units, and with other agencies and organizations, through participation in workshops, meetings, and conferences, and through demonstrations to FHP and other Forest Service field units; and (2) to improve remote sensing skills within FHP by providing training in airborne videography and photo interpretation.

Provided support and training to Region 2 FHP staff for photo interpretation of Forest Health Monitoring plot photography.

Conducted training on airborne videography to staff members of The Nature Conservancy.

Presented two papers and moderated a technical session at the 15th Biennial Workshop on Videography and Color Photography in Resource Assessment, hosted by Indiana State University.

Attended and participated in the National USDA Aerial Photography Meeting in Fort Worth, TX and in the Forest Service Annual Geometronics Meeting in Albuquerque, NM.

Conducted a joint airborne video pilot project over Fort Bragg, NC, in cooperation with Region 8/ FHP and the U.S. Army. The purpose of the project was to demonstrate and train video users in the use of the new automation modifications to the airborne video system on an operational mission. The video imagery will be used for general forest management as well as southern pine beetle and red-cockaded woodpecker (an endangered species) concerns.

Initiated a pilot project with the Stream System Technology Center attached to the Rocky Mountain Station. The purpose of this project is to demonstrate and evaluate the utility of large-scale color and color-infrared aerial photography and airborne videography as potential tools for assessing and monitoring stream conditions in a number of western sites.

Goal # 2: Maximize internal and public trust in Forest Service pest management programs (continued).

Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 2-1-C: Support communication and coordination of initiatives recommended in the Forest Health 2000 plan by sustaining presentation graphics and providing technical assistance in modifying and improving communication materials for presentation by Forest Service personnel (FHTET-FC, Regions, Area, and Washington Office).

Principal Cooperators:

FHTET

Leader: Scrivner

The objective of this task was to support communication and coordination of initiatives recommended in the Forest Health Technology 2000 plan by sustaining presentation graphics and providing technical assistance in modifying and improving communication materials for presentation by Forest Service personnel (FHTET-FC, Regions, Area, and Washington Office).

A format was developed to enable the production of coordinated presentation material. A presentation package containing slides, overheads, and note pages is being maintained, updated, and distributed as needed. This project has evolved into a Forest Health Technology Enterprise Team communication effort, which entails gathering information from the Enterprise teams in Davis, CA, Fort Collins, CO, and Morgantown, WV, to incorporate into a FHTET presentation package.

- Goal # 2: Maximize internal and public trust in Forest Service pest management programs (continued).
- Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 2-1-D: Establish a Values Determination Program as an ongoing emphasis area at FHTET-FC. In cooperation with other Forest Service staffs in National Forest System, Research, and universities, conduct a review of values determination methodology and values indicators. Conduct a direction-setting workshop to build upon the initiatives of the Forest Health Technology 2000 plan and assist in demonstration projects.

Principal Cooperators:

John Loomis Dept. of Forest Resources Colorado State University Ft. Collins, CO	Armando Gonzalez-Caban Fire Management and Economics, Pacific Southwest Station USDA Forest Service, Res. Riverside, CA	Bernie Lewis, Luther Gerlach Dept. of Anthropology University of Minnesota Minneapolis, MN
George Peterson Valuation of Wildland Resource Benefits, Rocky Mountain Station USDA Forest Service, Res Fort Collins, CO		Terry Daniel Dept. of Psychology University of Arizona Tucson, AZ

Leader: Smith

The objective of this task was to initiate a program of value determination concerning forest pest impact and forest health. Long-term goals and objectives for the program will be established through user interactions. Initial work will focus on coordination with similar work in other units of the Forest Service, a review of concepts and relevant studies, and a user-driven technology transfer plan.

Discussions were held with staffs involved in related work, including researchers at North Central Station, Southern Station, Rocky Mountain Station, Pacific Southwest Station, and RPA staff. The staff participated in a national joint Forest Service-Natural Resource Conservation Service Human Dimensions Workshop, and presented a paper at a regional forest economics meeting. A coordination meeting was held with research staff leading similar work for fire research (Gonzalez-Caban, Pacific Southwest) and a common university cooperator (Loomis, Colorado State University). A draft strategic plan was written as a part of the Forest Health 2000 process.

A cooperative agreement with Gerlach and Lewis (University of Minnesota) resulted in an extensive review of valuation theory and concepts in the natural resource management context. A survey of U.S. studies of non-timber economic impact of forest pests was completed and summarized. A cooperative agreement was initiated with Loomis (Colorado State University) to determine needs in forest health management for values information and the way those needs should be met.

Goal # 2: Maximize internal and public trust in Forest Service pest management programs (continued).

Objective # 1: Improve pest management knowledge and awareness at all levels. Enable Forest Health Protection to meet Forest Service commitment to integrated pest management (continued).

Task # 2-1-E: Offer opportunities for Forest Service employees and cooperators to obtain biometrics training to develop and enhance the credibility of insect and pathogen data acquisition and analysis conducted by field personnel.

Principal Cooperators:

Rudy King
Biometrics Unit
Rocky Mountain Station
USDA Forest Service, Res
Ft. Collins, CO

David Johnson
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Rocky Mountain Region
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Ron Kelley
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Pete Angwin
Forest Health Management,
Rocky Mountain Region
USDA Forest Service, S&PF
Gunnison, CO

James Byler
Forest Pest Management,
Northern Region
USDA Forest Service, S&PF
Coeur d'Alene, ID

Joan McAndrew (ded.)
Forest Health Protection, WO
USDA Forest Service, S&PF
Washington, D.C.

Leader: Smith

The objective of this effort was to provide consultation, cooperation in projects, and training opportunities for field studies and other projects requiring biometrics expertise. Projects vary in size and in level of FHTET-FC involvement.

Analysis and comment was provided for a white paper on nationwide mortality to be produced by the Washington Office. Information provided was used by the Resource Planning Act staff to answer a congressional inquiry. FHTET-FC staff served as a member of the National 615 Statistics Software Review Team, coauthoring the report to the Forest Service CIO and a draft national acquisition RFI/RFP. Also participated in the ad hoc Forest Service Biometrician Coordination Group, working on issues of training, software support, and consulting.

FHTET-FC is a partner in Forest Health Protection survey and analysis projects in Regions 1, 2, and 3, and NA. The Region 2 project was a landscape-level forest health study. FHTET-FC staff provided statistics expertise, supplied modeling expertise and assistance, and co-authored the final report. The projects in Region 3 and NA were initiated in FY 1995 and will continue in FY 1996. Recruiting for a contract biometrician was initiated; the position was filled in FY 1996.

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List of Acronyms

CANUSA	Canada-USA Spruce Budworm Program
DG	Data General
EPA	Environmental Protection Agency
FAM	Fire & Aviation Management
FHP	Forest Health Protection
FHTET	Forest Health Technology Enterprise Team
FHTET-FC	Forest Health Technology Enterprise Team-Fort Collins
FHM	Forest Health Management
FPIS	Forest Pest Impact Study
FPM	Forest Pest Management
FS	USDA Forest Service
FVS	Forest Vegetation Simulator
FY	Fiscal Year
GIS	Geographic Information System
IS&T	Information Systems and Technology
LAN	Local Area Network
NA	Northeastern Area
NAPIAP	National Agricultural Pesticide Impact Assessment Program
NFS	National Forest System
OIRM	Office of Information Resources Management
PAO	Public Affairs Office
PUM&C	Pesticide Use Management & Coordination
RPA	Resources Planning Act
RSAC	Remote Sensing Application Center
RSST	Remote Sensing Services Team
S&PF	State & Private Forestry
TDP	Technical Development Program
USDA	United States Department of Agriculture
WO	Washington Office

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